PDAC IN THE NEWS | MCW AWARD RECIPIENT | S-IMEW 2024 | DISTURBANCE REPORT | ADVANCES IN FIELD TRAINING

CORE

THE VOICE OF MINERAL EXPLORATION

FALL 2023

PDAC

PDAC 2024 PREVIEW

LOOK AHEAD TO THE PROGRAMMING AND OPPORTUNITIES AT THE WORLD'S PREMIER MINERAL EXPLORATION & MINING CONVENTION

CORE is produced by staff primarily located in Toronto, Ontario, on the traditional territory of the Mississaugas of the Credit First Nation, the Haudenosaunee, the Wendat, also known as the Huron, the Chippewa, the Anishnabeg and all other Indigenous nations that have lived on these sacred lands since time immemorial.

As the voice of mineral exploration and development in Canada, PDAC is committed to reconciliation through respectful dialogue and the creation of meaningful and mutually-beneficial partnerships between First Nations, Inuit and Métis communities and industry.

We respect that as an industry that operates the world over, we engage with organizations and individuals far beyond these lands, and wish to acknowledge all Indigenous lands and peoples across the world, wherever you are reading this from and call home.

CORE

FALL 2023

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PDAC IN THE NEWS

FALL 2023

OCTOBER WAS WOMEN'S HISTORY MONTH

For 11 years, government agencies, corporate entities and organizations across Canada have been celebrating the historical achievements, discussing the present inclusion of, and encouraging the outstanding future participation of women and girls during Women's History Month. (October was chosen by the government of Canada as October 18, 1929, was the date that women were legally declared "persons" in Canada.)

2023's theme is "Through Her Lens: Celebrating the Diversity of Women". PDAC represents over 7,000 members globally, and makes gender diversity and inclusion a priority in the programs and information it offers members and stakeholders.

Part of this is emphasizing the important developments made by women in the minerals industry, and proudly seeing that women are starting to hold stronger and higher positions in the mining development community. As of 2022, women made up only 16% of the workforce in the mining and quarrying industry, so Women's History Month is also a reminder that more progress needs to be made to advance gender equality in our country – for all industries, and for all people.

PDAC SUPPORTS "MINING NEEDS YOU" RECRUITMENT

Presented by the Mining Industry Human Resources Council (MiHR) and funded in part by the Government of Canada, *We Need Mining. Mining Needs You.* aims to inspire Canada's next generation of mining workers.

From advances in technological innovation to an important push for diversity and inclusion, while adhering to a commitment to environmental protection and reducing greenhouse gas emissions, *We Need Mining. Mining Needs You.* offers educational resources including interactive components and video presentations.

We Need Mining. Mining Needs You. also includes a scholarship program for post-secondary students and connects industry representatives with students through its Career Ambassador Program – developed in partnership with the Canadian Institute of Mining, Metallurgy and Petroleum (CIM). Through virtual and in-person speaking engagements, industry representatives tell their career stories to inspire youth to consider mining careers.

The program also offers annual scholarships, so for more information, click here or visit miningneedsyou.ca.

PDAC'S RESPONSE TO CANADA'S UNDRIP ACTION PLAN

September 30 of this year was Canada's third annual National Day for Truth and Reconciliation – a day of reflection on the residential school system tragedies, and their continuing effects on Indigenous communities. As Phyllis Webstad said in CORE's fall 2022 issue, "There can be no reconciliation without truth." This is why PDAC has been an active participant in the development and implementation of Bill C-15: An Act Respecting the United Nations Declaration on the Rights of Indigenous People (UNDRIP), which was put into place this year.

In a written submission to the federal government, PDAC supported Bill C-15, while strongly urging more resources be dedicated to direct engagement and consultation with Indigenous communities – especially those in northern and remote areas of the country. By investing in early engagement, community capacity building, and the immediate supply of fast, reliable communications technology for remote communities, the government and industry will be better positioned to consult more meaningfully, and create much-needed opportunities for inclusion, as UNDRIP calls for.

As the mineral industry in Canada is the largest private-sector employer of people identifying as Indigenous, it is paramount that priorities now be placed on more frequent and effective communication, if the country is to follow through on providing meaningful participation and mutually-beneficial partnerships with Indigenous Peoples.

PDAC'S STRATEGIC PLAN LOOKS AHEAD TO THE FUTURE OF THE INDUSTRY

After a three-day workshop with PDAC's Board of Directors and senior staff, the framework for the 2023-2028 Strategic Plan was formed, which aimed to build on the objectives from previous years, while putting a greater focus on goals affecting the industry.

The new plan adds emphasis to members', stakeholders' and industry partners' sustainability and environmental stewardship. While those elements have always been a focus in PDAC's policies and practices, they were not given as prominent a position in the previous plan. These are important objectives to guide the Canadian mineral exploration and mining development community to becoming a world leader in the transition to a low-carbon future.

PDAC has also included stronger commitments around promoting and supporting Indigenous communities, collaboration, inclusion, education, access to land, access to capital, and elevated performance.

Along with an updated Mission, Vision and Values statement, PDAC believes the new 2023-2028 Strategic Plan will be a great benefit to the association's members, stakeholders and industry partners. Click here to read the full plan.

E3 PLUS GETS AN UPGRADE ON ITS 20-YEAR ANNIVERSARY

First established twenty years ago in 2003, PDAC's "e3 Plus: a Framework for Responsible Exploration" program set out to offer a comprehensive set of resources for members in our industry, including guidelines on social responsibility, environmental responsibility, and health and safety.

PDAC HOLDS ITS INAUGURAL OPEN HOUSE IN TORONTO

On September 26, more than 50 PDAC members gathered at the association's offices for its first-ever Open House. During the evening, members from the Greater Toronto Area networked with PDAC's Board of Directors, past presidents, committee members and staff.

Exhibits highlighting PDAC's programming were on display, including our Student & Early Career program, Geoscience and Innovation, Sustainability, and Access to Capital. Members were also treated to an exclusive display of critical minerals from the remarkable Kirwin Collection, presented by Toronto's Royal Ontario Museum.

A reception and photo booth complemented the lively atmosphere at the Open House. Prize draws were held, and lucky members received two All-Access Convention passes, two complimentary memberships, and a PDAC swag bag.

PDAC thanks all attendees of this inaugural event, and we look forward to seeing our members again in Saskatoon in late November. This event will be co-hosted with the Saskatchewan Mining Association during the Saskatchewan Geological Open House.

With advancements in technology emerging over the last two decades – including digital device use becoming more common than printed matter – as well as important new policies on accessibility and inclusion, PDAC has endeavoured to update the three major resource documents within the e3 Plus program. These documents (also known as "toolkits") are provided as free downloadable PDF files from PDAC's website, and represent comprehensive handbooks that provide best practices for the industry with case studies, data, actionable items and suggested procedures. The titles for the three toolkits in the e3 Plus program are "Excellence in Environmental Stewardship Toolkit (EES)", "Health and Safety in Exploration Toolkit (EHS)", and "Social Responsibility in Exploration Toolkit (ESR)".

Updating the program's toolkits involves several working groups made of industry experts, as well as PDAC's own Communications and Policy teams. Together, these groups have held active discussions that have lead to updates in language and terminology, plus a redevelopment of the PDF documents themselves to create a better user experience, taking into account AODA (Association of Ontarians Disability Act) guidelines related to fonts, colour and contrast ratios for e-readers and other assistive devices. This effort is part of Phase 1 of the program's rebranding, which is producing a modern, easy-to-navigate set of PDF files for use both in-office, and in the field.

Click here or visit pdac.ca/e3plus for more information and updates on the e3 Plus program, and to download the current version of the toolkits.

PDAC RESPONDS TO ECCC'S BIODIVERSITY DISCUSSION PAPER

Earlier this year, Environment and Climate Change Canada (ECCC) hosted a National Biodiversity Symposium to begin the process of updating Canada's National Biodiversity Strategy and Action Plan (NBSAP), which – in accordance to the 2022 commitment of the Kunming-Montreal Global Biodiversity Framework (GBF) – must be completed in time for COP16 in 2024.

ECCC's strategy following the symposium was to develop a discussion paper, titled "Towards a 2030 National Biodiversity Strategy", with the purpose of guiding the development of Canada's NBSAP by gathering information, ideas and perspectives on biodiversity conservation in Canada from various sources and entities.

Recently, PDAC formally submitted a response to the discussion paper to outline how mineral exploration can contribute to the realization of biodiversity targets. This includes recommendations and suggested approaches that policy-makers can adopt to ensure long-term environmental, social and economic benefits. Click here to read the response.

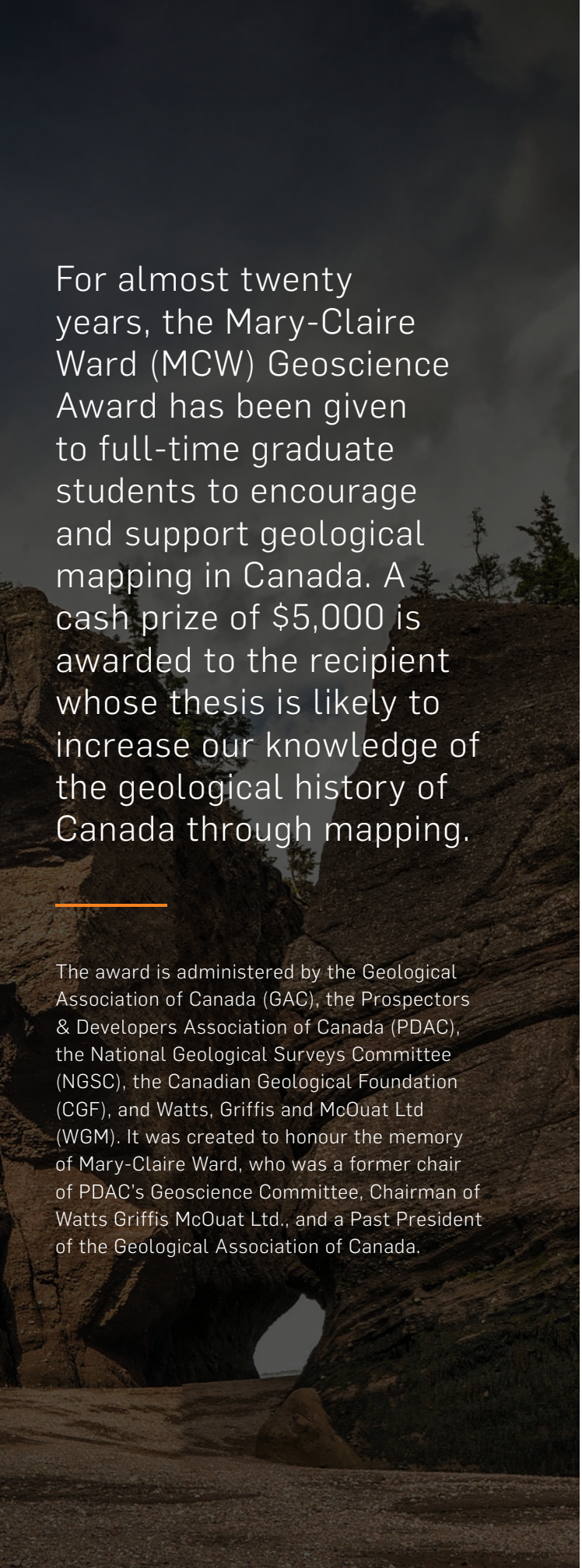
MEMBERSHIP REFERRAL PROGRAM SUCCESS

PDAC thanks everyone who participated in its new Membership Referral Program. 2023 was the first full year of the Program, and we were excited to see the buzz and engagement that a little friendly competition generated within the Association. Over 240 members from almost two-dozen countries helped us welcome more than 370 new PDAC members.

On September 26 of this year, our grand prize winners were announced and 22 winners from countries all over the world received convention experiences, travel vouchers, technology gifts, cash prizes, gift cards and PDAC swag. For a list of the winners, click here or visit pdac.ca/memberdraw.

In 2024, we invite you to participate for the chance to win a free booth at the 2025 Convention, plus more monthly draws and other great prizes. To join this exciting Member Referral Program, log in to the Members' portal to access the member referral dashboard. You can refer as many members as you like, so if you know someone who could benefit from a PDAC membership, refer them today for a chance to win.

MARY-CLAIRE WARD GEOSCIENCE AWARD 2023



For almost twenty years, the Mary-Claire Ward (MCW) Geoscience Award has been given to full-time graduate students to encourage and support geological mapping in Canada. A cash prize of $5,000 is awarded to the recipient whose thesis is likely to increase our knowledge of the geological history of Canada through mapping.

The award is administered by the Geological Association of Canada (GAC), the Prospectors & Developers Association of Canada (PDAC), the National Geological Surveys Committee (NGSC), the Canadian Geological Foundation (CGF), and Watts, Griffis and McOuat Ltd (WGM). It was created to honour the memory of Mary-Claire Ward, who was a former chair of PDAC's Geoscience Committee, Chairman of Watts Griffis McOuat Ltd., and a Past President of the Geological Association of Canada.

The 2023 MCW Geoscience Award recipient is Darius Kamal, from the University of British Columbia.

For his PhD, Darius' research aims to establish how rock deformation during crustal shortening events impacts the distribution, preservation and grade of sediment-hosted massive sulfide (SHMS) Zn-Pb deposits. It is focused on the region of the Selwyn Basin that stretches along the border of Yukon and Northwest Territories, around and between the Howard's Pass and MacMillan Pass deposits. Mapping will focus on 4D (temporal and spatial) geometric and kinematic analysis.

We asked what receiving the award means to him, how he first got started in the field, and his thoughts about the future of geoscience.

The following pages are our exclusive Q&A with Darius.

> I don't think desktop studies will ever replace boots-on-the-ground geology, but the ability to 3D model key outcrops or areas...is a fantastic innovation in geoscience that will only get better.

PDAC: What specifically attracted you to the field of geoscience?

I started my undergraduate degree in Biology because I wasn't exposed to any Earth Science classes in high school. I took a first-year Geology class as an elective and quickly realized it was the only class where I attended every lecture! I switched my major to geology once I had seen the course content and field trips available in the following years.

My favourite subject is history, and geoscience is essentially the history of the Earth, recorded in the rocks. To be a geologist is to spend time outdoors, hiking and camping, trying to unravel the puzzle of Earth's history. When I saw that my job could be an adventure every day that could take me to the most beautiful places in Canada and internationally, I knew I would not be happy sitting behind a desk for my career.

What did winning the MCW Geoscience Award mean to you?

A large portion of my Ph.D. studies involves months of structural and lithostratigraphic mapping in the Yukon and Northwest Territories. The mapping aims to look at the evolution of the Selwyn Mountains Fold-and-thrust Belt, and the deformation of the sediment-hosted massive sulfide deposits it contains. The Mary-Claire Ward Geoscience Award focuses explicitly on the merits of geological mapping and how it contributes to Canadian Geoscience – to receive this award for my geologic mapping is the highlight of my Ph.D. so far. I will be proud of the recognition of my efforts as an important contribution to geoscience in Canada for my whole career.

Attending PDAC's Convention to receive the award was a fantastic opportunity to present my research and network with other students and industry professionals. I also used a portion of the award to get a new bike, which has been excellent for getting around Vancouver!

I encourage all students to take every opportunity to do fieldwork and apply for the award if mapping is a component of their project.

As a graduate student, are there any tools or programs that you see in place now for students or early graduates, that you wished were in place when you first started?

The pandemic kick-started a series of geoscience resources that have helped make education and advice more accessible to students and early career industry professionals. Nowadays, it is possible to attend conferences virtually if it is too expensive to participate in person. Most lectures and talks are recorded to be viewed later, and a thriving YouTube and Podcast community is bringing exciting and diverse geoscience talks to everyone, regardless of location. None of this content was available during my undergraduate degree, so our network was small. As a student or early graduate, there are so many resources available for free now to complement your education and help you decide what your main interests are within geoscience, especially for future graduate work. Additionally, the global community of geoscientists is more connected now than ever for work and school opportunities.

What advice would you give to younger high school students looking at geoscience as a possible career?

One of the most exciting things about geoscience is that it combines the classical disciplines you study in school. If you are interested in chemistry, physics, biology, or maths, then geoscience is a career path that combines all these subjects. Geoscience is a fantastic non-conventional career path if you are interested in the outdoors, travelling, and working with a diverse range of people. However, studying geology in the classroom differs significantly from working in the field. I encourage all students during their studies to try and gain summer work experience in the field and connect with industry professionals to see what work outside of the classroom is like.

What is the most exciting development you've seen in the field of geoscience? This could be something you've encountered yourself, or something from the past that has always fascinated you.

One of the biggest challenges of geology is dealing with the terrain. Most of my work is spent fly-camping and hiking up and down steep mountains for months in the summer. Recently, I have started to see the most amazing high-resolution imagery and 3D models of large areas where it is possible to identify stratigraphy and structure, almost as if you are there in person. There is a saying that you should "treat every outcrop like you will never be back", but with advances in photogrammetry and satellite imagery, it is becoming more and more possible to capture data in the field and then revisit it at a high-resolution from your computer.

I don't think desktop studies will ever replace boots-on-the-ground geology, but the ability to 3D model key outcrops or areas as discussion points for the community or as teaching tools is a fantastic innovation in geoscience that will only get better.

Do you have a five or 10-year personal plan for what you'd like to be doing, or have achieved with your work?

I went to graduate school to study Structural Geology, focusing on geologic mapping applied to ore deposits – because I believed there was a skills gap in the industry. Five to ten years from now, I would like to use the skills I gained during my graduate studies to be a structural geology subject-matter expert in the industry. There is an ever-increasing demand for critical metals to transition away from fossil fuels. Consequently, mining efforts are being targeted at smaller, more structurally complex deposits that are deep undercover.

In the future – more than ever before – there will be a need for a rigorous structural understanding of the geometry and kinematic history of these deposits for efficient extraction. I want to be one of the industry leaders providing this expertise. I want to stay connected to academia by supporting student projects and helping create and lead industry-academic collaborations. Also, if most of my future work involves geologic mapping, I will consider it a great success.

The industry has recognized the need for greater diversity in the workforce, and we see many companies taking steps to move forward in this area. Have you found this to be the case in exploration?

Since I started my undergraduate degree in 2013, I have seen the exploration industry slowly begin to take steps towards a diversified workforce that has increased from the pandemic onward. I think it is more common now in any international work to hire geoscientists from the local community. I have also seen a push to recruit students from local surrounding regions if a graduate project is based on an international deposit or field site. However, the exploration industry has major steps to take before a genuinely inclusive, diversified workforce exists. Due to the Canadian summer field season, it is typical for early-career geoscientists not to be retained during the winter. Consequently, many geologists who are new to the country, have young families, or have loans from their education move into different industries to provide for themselves and their families with stable work. The advent of remote work has provided more opportunities for the retention of geologists, but only a small percentage of people are able to only work a portion of the year for the first few years of their career. In order to reach a fully diversified workforce, the exploration industry needs to be able to retain geoscientists from all socio-economic backgrounds, rather than the few who are able to weather seasonal work or spend long periods away from home.

What do you think we might see, or what would you like to see in the future of geoscience in 10, or 100 years from now?

Geoscience is one of the most exciting but challenging careers one can choose. Often, geoscientists spend long periods travelling and away from home. I know many people who have left the industry because the stress on their personal lives has become too much. There is a prevailing stigma, though, that you should not be a geoscientist if you can't endure these long periods away from home. I would like to see the geoscience community move more towards supporting people's mental health and their own unique needs. It would be great if the industry fostered a healthy relationship between one's work and personal commitments, rather than the all-consuming work mentality we often see.

I think if this equilibrium is achieved and there are healthier work-life balances in the industry, it will also encourage more young people to enter our field and have a longstanding and fruitful career in geoscience. I believe the geoscience community has come a long way in the last few years, especially with the advent of remote work, but I also think there is a long way still to go.

Did you know?

Through PDAC's Human Resource Development (HRD) Committee, there are over a dozen student awards, bursaries, funding opportunities and scholarships available. To read more about the various financial support programs PDAC offers for students, click here or visit pdac.ca/financialsupport.

“I would like to see the geoscience community move more towards supporting people’s mental health and their own unique needs.”

PDAC 2024
PDAC
2024
CONVENTION
THE AWARD-WINNING EVENT WILL BE
HELD MARCH 3-6, 2024 IN TORONTO

> The energy and optimism witnessed during PDAC 2023 was palpable – it is clear the mineral exploration and mining industry has entered a period of great transformation and growth.
>
> **- Alex Christopher**
> Past PDAC President

PDAC 2023 was one of the largest events in the association's 91-year history.

The following pages are some exciting stats from PDAC 2023, plus information on the engaging exhibits, programming, events and networking opportunities that are in store for 2024!

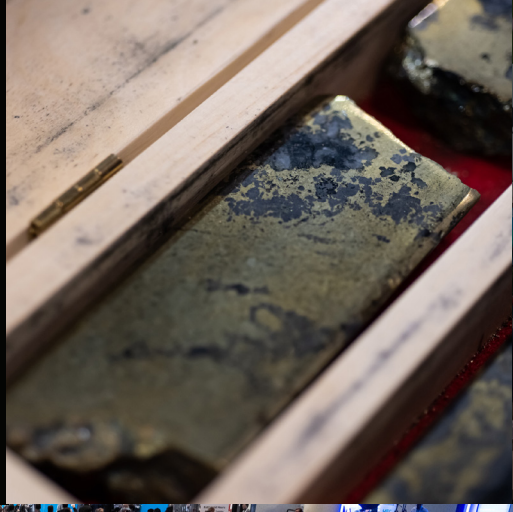
First, here are some important dates for the upcoming world's premier mineral exploration and mining showcase:

Registration opens this December!
pdac.ca/registration

The early registration deadline is February 9, 2024.

The deadline to purchase tickets for the Awards Gala & Nite Cap and the Breakfast Social is February 23, 2024.
**Attendee registration will still be available*

1,116
EXHIBITORS
IN 2023



23, 819
ATTENDEES FROM
133
COUNTRIES
IN 2023

717
PRESENTERS
IN 2023

SAVE THE DATE!
March 3-6, 2024
pdac.ca/convention

EXHIBITS

Spread over both the North and South Buildings of the MTCC, PDAC 2024 will showcase another full slate of exhibitors from across the globe.

TRADE SHOW & TRADE SHOW NORTH

Visit over 600 exhibitors showcasing the world's leading technologies, products and services, and meet government representatives from across the globe. This includes the Northern Ontario Mining Showcase (NOMS) – largest pavilion at PDAC featuring over 110 exhibitors and interactive displays showcasing innovative products and services to help plan, build, maintain, and rehabilitate projects around the world!

CORE SHACK

Providing a unique venue for companies to display their core samples. Attendees can get up close to new or ongoing projects that are generating exciting drill results. The latest discoveries from all corners of the Earth will be featured along with maps, charts and technical information.

INVESTORS EXCHANGE

Discuss investment potential with 450 junior mining companies, mid-sized producers, major mining companies, financial institutions and prospectors to discover new business opportunities.

PROSPECTORS TENT

Get to the heart of the industry with a visit to the Prospectors Tent. Self-employed prospectors will be there to discuss their maps, samples and claim results.

STUDENT MINERALS COLLOQUIUM (SMC)

The SMC brings together geoscience students and industry professionals to highlight innovative student research on projects essential for the successful evolution of the modern mining industry.

Students (BSc, MSc, PhD) working on projects linked to mineral deposits including mapping, mineralogy, geochemistry, geophysics, environmental and hydrogeology have the opportunity to share their research with an audience of academics and industry professionals.

INDIGENOUS ARTISTS

An initiative aimed at showcasing work of talented artists from across Canada, increasing the presence of Indigenous vendors on the show floor.

To exhibit and for more information visit
pdac.ca/convention/exhibits

PROGRAMMING

The annual convention hosts a wide range of presenters, industry experts and facilitators offering their knowledge, strategies, new concepts, case studies and more.

CAPITAL MARKETS

Access to capital is the lifeblood of the mineral exploration industry. This program creates a forum for dialogue on a range of topics related to the financing of mineral exploration.

CORPORATE PRESENTATION FORUM FOR INVESTORS (CPFI)

New for 2024 – many CPFI sessions will take place in a theatre on the Investors Exchange show floor. This popular series features up-to-the-minute information on select exploration and development companies' current activities and investment potential. This series continues to be of strong interest to investors, highlighting the scope of commodities and stages of development represented at the convention, now including micro cap companies.

EXPLORATION INSIGHTS

Exploration Insights will showcase research related to the industry's artificial intelligence (AI) age. Session one will focus on new or updated exploration concepts and tools, while session two will focus on case histories, tools, and exploration strategies.

KEYNOTE PROGRAM

The Keynote Program features four themes designed to inspire and educate: commodity outlook, mining industry outlook, technology and innovation, and discovery of the year. Presenters will discuss new and exciting concepts and explore the compelling challenges of mineral exploration and development in 2024. The premium lineup includes Jakob Stausholm (Global CEO, Rio Tinto), Michael Stanley (Mining Lead, The World Bank), Denise Johnson (Group President of Resource Industries, Caterpillar), and the Thayer Lindsley Award recipient.

INDIGENOUS PROGRAM

Uncover the fundamentals of building cooperative, respectful and mutually beneficial partnerships between Indigenous communities and the minerals industry. This program brings Indigenous-owned companies, communities and individuals together with industry representatives to share experiences, exchange ideas and network. Indigenous leaders, industry experts and legal professionals exchange their visions of prosperity and reconciliation with PDAC's global network.

LETTER WRITER PRESENTATIONS FOR INVESTORS

Top newsletter writers and other professionals who inform investment decisions in the mining industry gather at this session to present their thoughts, charts, research reports, and ideas on the criteria they use to select profitable investments in the resources sector. New for 2024 – The presentations will take place in the new theatre, found on the Investors Exchange show floor.

MASTER CLASS SERIES

Learn from industry leaders as they share key insights and case studies throughout this exclusive series of presentations.

SHORT COURSES

These are in-depth educational sessions led by presenters with expertise in a variety of different subject matter. Sessions range from a half-day to two full days in length.
Short courses are ticketed – purchase online before they sell out!

STUDENT & EARLY CAREER PROGRAM

This program allows students and early-career individuals the unique opportunity to connect with industry professionals from around the world. Learn about the diverse range of careers and attend engaging presentations to stay up to date on exciting industry developments.

SUSTAINABILITY PROGRAM

Join a facilitated multi-stakeholder dialogue and peer learning on key issues related to responsible exploration and mining. This program features presentations and conversations that examines the innovative ways in which mineral exploration and mining companies are working to improve their sustainability. Both challenges and successes will be presented, as well as lessons learned.

TECHNICAL PROGRAM

Industry experts discuss current and emerging trends, technologies, research and analysis in a dynamic series of presentations. Presenters share their practical experience, insights and a look to the future. Topics include green energy transition and critical minerals, diamonds, geophysics, and more.

PRESENTATION & RECEPTION ROOM PROGRAM

Visit international mining jurisdictions and companies launching a product, hosting receptions, presenting a workshop or a special presentation. Don't miss these exclusive sessions, including Canada, Peru and more! Room rental applications are open until February 2, 2024, or until all rooms are reserved. Click here or the link below to apply.

PDAC ONE-ON-ONE MEETING PROGRAM

In partnership with Precious Metals Summit Conferences, LLC, PDAC offers professionally organized one-on-one meetings, which bring qualified investors together with companies' senior management. This exclusive program is offered only to a select group of confirmed Investors Exchange and Core Shack exhibitors, carefully screened, qualified investors and portfolio managers from around the world.

For more information on the engaging programming scheduled for 2024, click here or visit pdac.ca/convention/programming

EVENTS & NETWORKING

Don't miss these valuable networking opportunities!

OPENING CEREMONIES
Join Raymond Goldie, PDAC President and other special guests as we mark the official opening of the 2024 Convention.

THE NETWORK
Are you looking for valuable networking opportunities at PDAC 2024? PDAC's largest networking event will connect you with domestic and international professionals where you can discuss matters shaping the industry. Join us for a complimentary drink and snacks, while you mix and mingle with potential business contacts while spinning the wheel, rolling the dice and playing to win cash prizes in our casino!

MINING FOR DIVERSITY
Women in Mining Canada (WIMC) is pleased to host this annual awards ceremony and networking event. Join us as we celebrate the Trailblazer Awards Series winners, and network with other industry professionals.

BREAKFAST SOCIAL | NEW FOR 2024!
Fuel up for your busy day at Convention at PDAC's first-ever networking breakfast! Purchase your ticket online with your registration.

COFFEE CONNECTIONS | NEW FOR 2024!
Join us for a complimentary coffee to start your day right!

HAPPY HOURS | NEW FOR 2024!
Enjoy a glass of wine or beer as you network with exhibitors and attendees from around the world.

STUDENT-INDUSTRY MIXER

This event provides an opportunity for students, early-career and industry professionals to network in a relaxed environment. The recipients of the Mary-Claire Ward Geoscience Award, ERM Bursary and the 2024 Student-Industry Mineral Exploration Workshop (S-IMEW) students will be announced. Student members will be entered into a draw for three $500 tuition top-up awards.

Student members from Canadian post-secondary institutions can apply for travel funding to help cover the costs of getting to Toronto. www.pdac.ca/students/pdac-convention-2024.

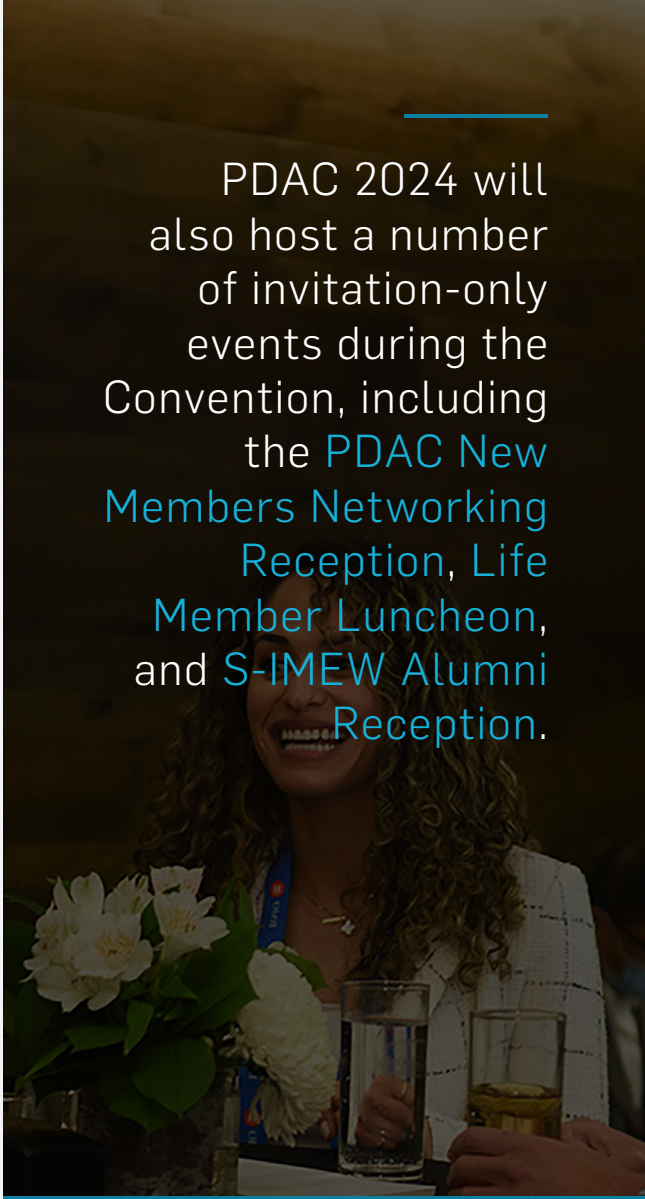
AWARDS GALA & NITE CAP

The PDAC Awards Gala celebrates excellence in the global mineral exploration and mining industry, and is the ideal place to host your clients and network with key players. Join us as we acknowledge the extraordinary accomplishments of the 2024 Awards Recipients for the Bill Dennis, Skookum Jim, Sustainability, Thayer Lindsley and Viola R. MacMillan Awards.

At the Gala, enjoy cocktails on arrival, a sumptuous three-course gourmet dinner and fine wines. Then, it is on to the Awards Nite Cap! Your opportunity to enjoy a drink and rub shoulders with the Award Recipients, C-level executives, financiers, brokers and mining developers: the perfect backdrop for unlimited networking! Tickets sell quickly – the Awards Gala was a sold-out event in 2023 – so be sure to buy online with your registration!

PUB NIGHT FINALE

Relax, celebrate and network at the Pub Night Finale! Dress casually, grab a bite to eat and dance to your favorite tunes with the Dave Murphy Band! If games are your thing, play Pool, Foosball or Air Hockey! Feel like a Hollywood star with the new 360 Photo Booth as it rotates, capturing your best moves! Get your digital photo immediately, to share with your team or social media.



PDAC 2024 will also host a number of invitation-only events during the Convention, including the PDAC New Members Networking Reception, Life Member Luncheon, and S-IMEW Alumni Reception.

Click here for a comprehensive list of events and networking opportunities, or visit pdac.ca/convention/events-networking

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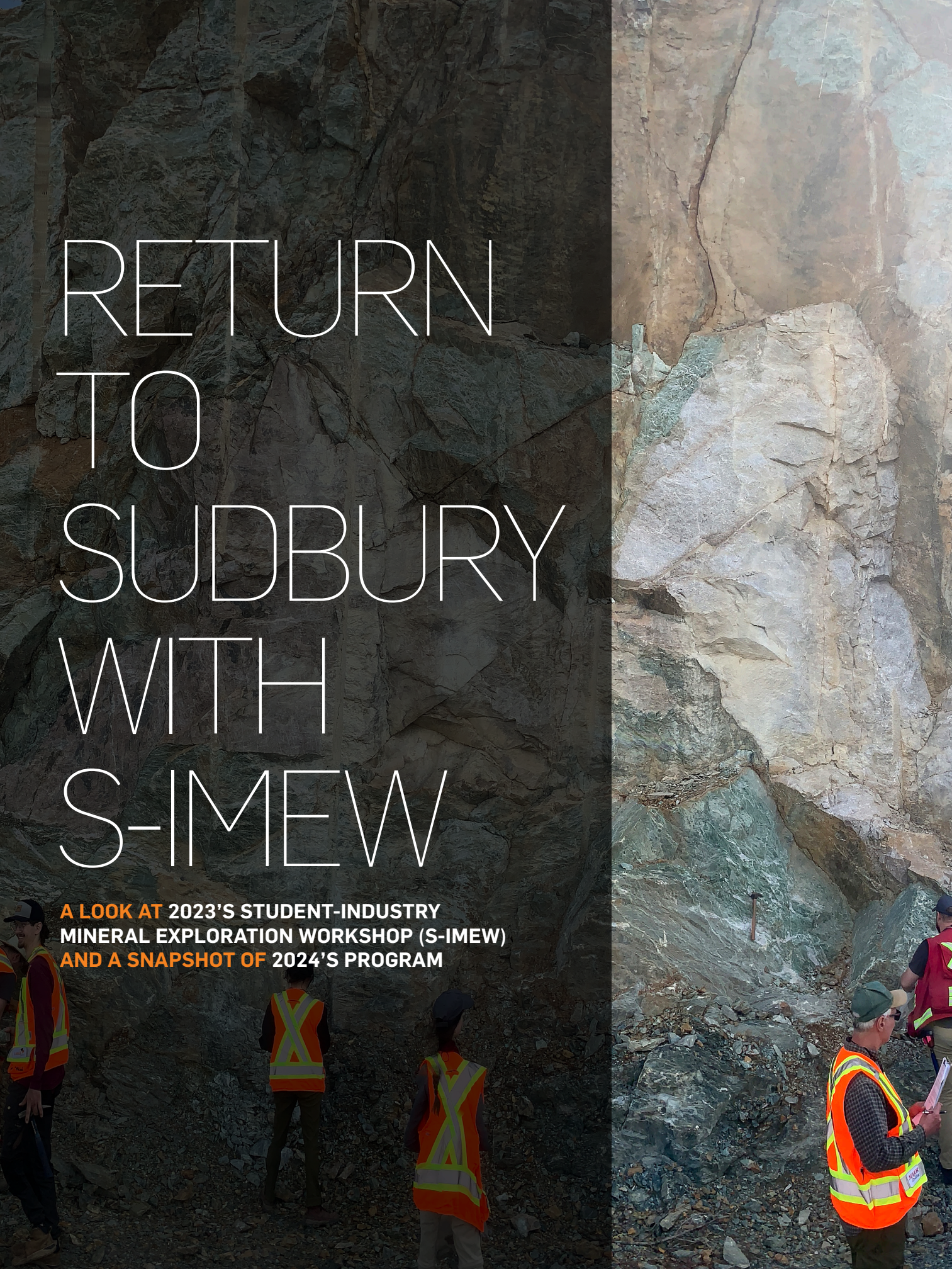
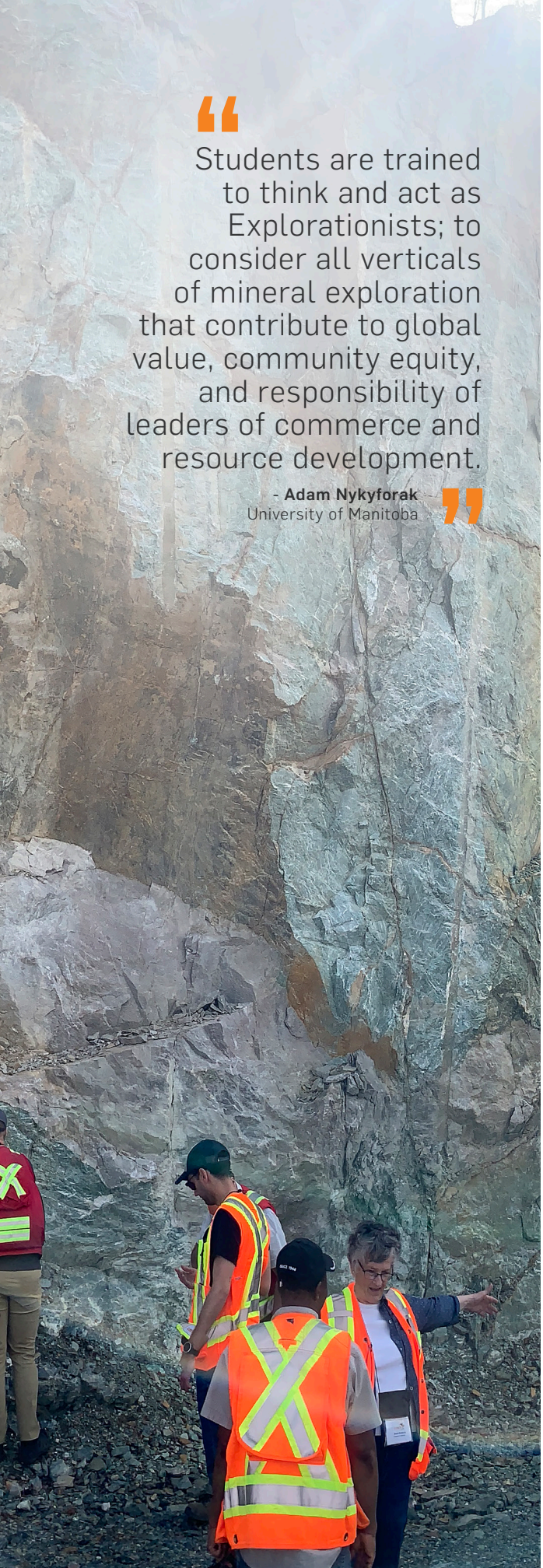
RETURN TO SUDBURY WITH S-IMEW

A LOOK AT 2023'S STUDENT-INDUSTRY MINERAL EXPLORATION WORKSHOP (S-IMEW) AND A SNAPSHOT OF 2024'S PROGRAM





> Students are trained to think and act as Explorationists; to consider all verticals of mineral exploration that contribute to global value, community equity, and responsibility of leaders of commerce and resource development.
>
> - **Adam Nykyforak**
> University of Manitoba

Between May 4-16, 2023, the celebrated geoscience program returned to Sudbury, Ontario with 22 students for two weeks of geoscience and exploration activities.

After a three-year pandemic-related pause, PDAC relaunched its celebrated two-week workshop. S-IMEW provides students a comprehensive, hands-on experience, including site visits, field exercises, engaging presentations and networking opportunities that helps them lay the foundation for a successful career in the mineral exploration industry.

Held in some of the most well-known mining regions of Ontario, the 2023 workshop included several new and unique components.

For the first time in the program's history, the Workshop took students on a four-day field trip to Kirkland Lake and its surrounding areas. There, they had exclusive access to hands-on, *in situ* core logging with the exploration team at IAMGOLD's Côté Gold project, and underground mine tours at Agnico Eagle's Macassa and Alamos Gold's Young-Davidson gold mines. They also learned about the Kirkland Lake-Larder Lake gold belt with the Resident Geologist, and were given a close-up, guided look at the geology of Cobalt and Temagami.

A new wellness component was added for Workshop participants, which included yoga sessions, access to the on-campus gym, and a fitness centre. Plus, with an increase in free time over previous years, students were provided a better opportunity to process the Workshop's activities. This was also the first year that S-IMEW used a custom mobile app, which facilitated increased engagement between all participants, including students, presenters and sponsors. With the app, Workshop materials – reference guides, itineraries and more – were shared digitally, reducing S-IMEW's carbon footprint in 2023.

New sessions were also added – Darla Bennett, Indigenous Geoscience Liaison with the Ministry of Mines, engaged students in talks on Indigenous consultation in the Ontario Geological Survey (OGS), and an all-encompassing session on community engagement in the minerals industry was presented by Colin Webster, Vice President of Sustainability and External Affairs at Alamos Gold.

S-IMEW was a fantastic opportunity to build industry connections while learning specialized skills from world-class experts, and has already directly benefited my career.
- Lindsay Richards
Vancouver Island University

S-IMEW and PDAC continue to strive for inclusion at all levels, and are strong advocates for Indigenous representation and community partnership. PDAC's past president, and now a Vice President of Ring of Fire Metals, Glenn Nolan, delivered an inspiring opening keynote address at the Welcome Reception. This event attracted over 80 industry professionals – including sponsors and presenters – giving students a head start on building their networks.

Networking has always been an important daily component of the program. Two major events during S-IMEW include the Geophysics Dinner and Geochemistry Dinner. Teck Resources has been a longstanding sponsor of the Geophysics Dinner, which brings together students and geophysics presenters from across the country. The Geochemistry Dinner – supported by SGS Canada – assembles students and Geochemistry Day presenters together. S-IMEW's alumni – comprised of over 200 professionals, now working in the industry – are also a valuable networking resource for the program's students. Over 20 alumni have come full circle to present at the annual workshop, sharing their post-graduation experiences at the S-IMEW Alumni Reflection sessions.

Rounding out 2023's programming and activities was another underground tour, hosted by Glencore at the Nickel Rim South Mine, Sudbury, followed by a guided tour of a Foraco drill at one of Glencore's exploration projects.

Looking ahead, students attending 2024's Workshop can anticipate high-level programming, exclusive access to surface and underground mine sites, hands-on experience in exploration and regional mapping, geophysical surveys, geochemical sampling methods and core logging, as well as unique opportunities to network with industry leaders and experts.

S-IMEW 2024 will be hosted in Sudbury, Ontario, May 1-16.

To take part, geoscience students must be nominated by their departments. Each Geoscience department in Canada can nominate up to two students.

To learn more about the workshop, and access the 2024 nomination package, click here or visit pdac.ca/members/students/s-imew.

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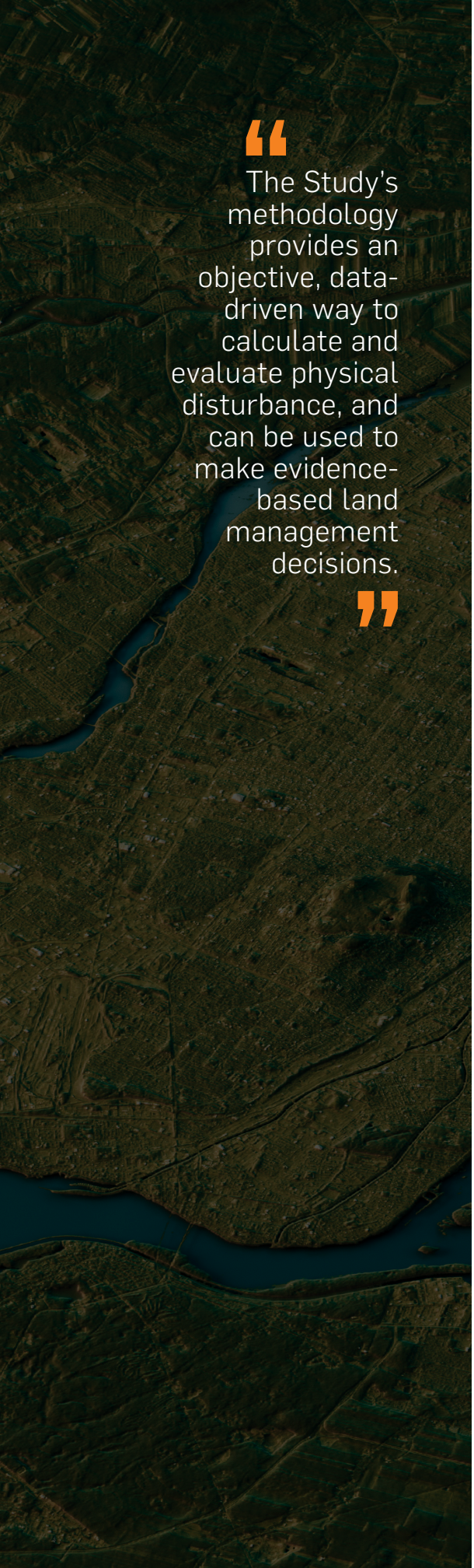
> "The most crucial part of this trip was sharing this experience with great people."
>
> - **Billy Yeomans**
> University of Victoria

ASSESSING MINING-RELATED LAND DISTURBANCE



> The Study's methodology provides an objective, data-driven way to calculate and evaluate physical disturbance, and can be used to make evidence-based land management decisions.

This fall, PDAC and the Mining Association of Canada (MAC) completed a study that employed a new methodology to more accurately identify the impact of physical land disturbance caused by mining-related activities.

Across all phases of the mining life cycle – from early exploration through to mine closure – this study analyzed site-specific geographical features while creating a custom classification process, which presents an evidence-based and accessible approach to estimating the physical disturbance of mining and exploration projects across the mineral development sequence. The new methodology presented in this study also enhances and adds to the existing body of research in this area.

The Methodology to Assess Mining-Related Land Disturbance study was commissioned by Land & People Planning (L&P), in partnership with O2 Planning and Design (O2).

Case Studies & Methodology

The methodology was applied to eight case study sites across Canada, including in Nunavut, Ontario, Saskatchewan, Quebec and British Columbia. The sites were chosen for the Study because of the biographical range they presented (arctic, boreal, and hemiboreal regions), their location along the mineral development sequence (exploration, operation, closed) the variety of commodities they represent (gold, silver, uranium, copper, nickel and platinum group elements), and mining method (open pit vs underground).

These sites were studied during the entire project life cycle. This included early and intermediate exploration phases, advanced exploration phase, mine development and operation stages, closure and post-closure phases, as well as reclamation activities.

Landsat 5 and Landsat 8 medium-resolution satellite imagery was used to provide up to 48 time-step images of the case study sites, during the various phases of their life cycle. These image sequences were used to identify and quantify the physical disturbances associated with built mine infrastructure for open pits, buildings, tailings, waste rock, roads and airstrips.

Using this methodology, an initial classification system was used to acquire estimates of the cumulative disturbance associated with built infrastructure at the study's mine sites. After image and data review, a revised classification was implemented which improved the accuracy of the Study's findings.

Key Findings & Conclusions

Through the eight case sites across Canada, the Study demonstrated that the new methodology is effective at identifying and quantifying physical disturbance associated with infrastructure built directly related to various mineral exploration and mining projects. This includes identification and quantification of physical disturbances corresponding with infrastructure such as: ore processing facilities, mine waste management facilities (and stockpiles of other related materials), roads, airstrips and buildings on site (accommodations, administration buildings, etc).

The Study does conclude that there are limitations to using the medium-resolution satellite imagery as described in the methodology. Some examples that the methodology is dependent on includes the availability of cloud-free, snow-free images, and that the studied sites are not within a certain proximity of other industrial activities (forestry projects, municipal developments, etc), as these activities can produce disturbances that are similar to those associated with mineral exploration or mining activity. Additionally, from satellite imagery alone, it may be difficult to distinguish certain disturbances produced during various phases of a project's life cycle from adjacent natural, undisturbed geography.

Even with these limitations taken into account, the methodology introduced in this study proved the actual land disturbance from mining-related activities was relatively low. This is a significant contrast between the speculation of other studies, especially among the exploration-stage projects that were analyzed. The data gathered from the eight case studies shows that the proportion of the disturbance area to the claim area is significantly lower than previous assumptions.

In fact, using this methodology, four of the eight mineral activity sites had peak disturbance areas less than one percent of the mining claim area.

Future Applications

The Study's methodology provides an objective, data-driven way to calculate and evaluate physical disturbance, and can be used to make evidence-based land management decisions. Additionally, the methodology may estimate land disturbances associated with other activities – forestry, oil and gas development, urbanization, and the development of energy corridors – to measure cumulative disturbance impacts within different regions and sectors. There is a large research opportunity on this subject. The Study presents an introductory effort that, inherently, just scratches the surface, and we hope to see the methodology adopted and applied across additional project sites.

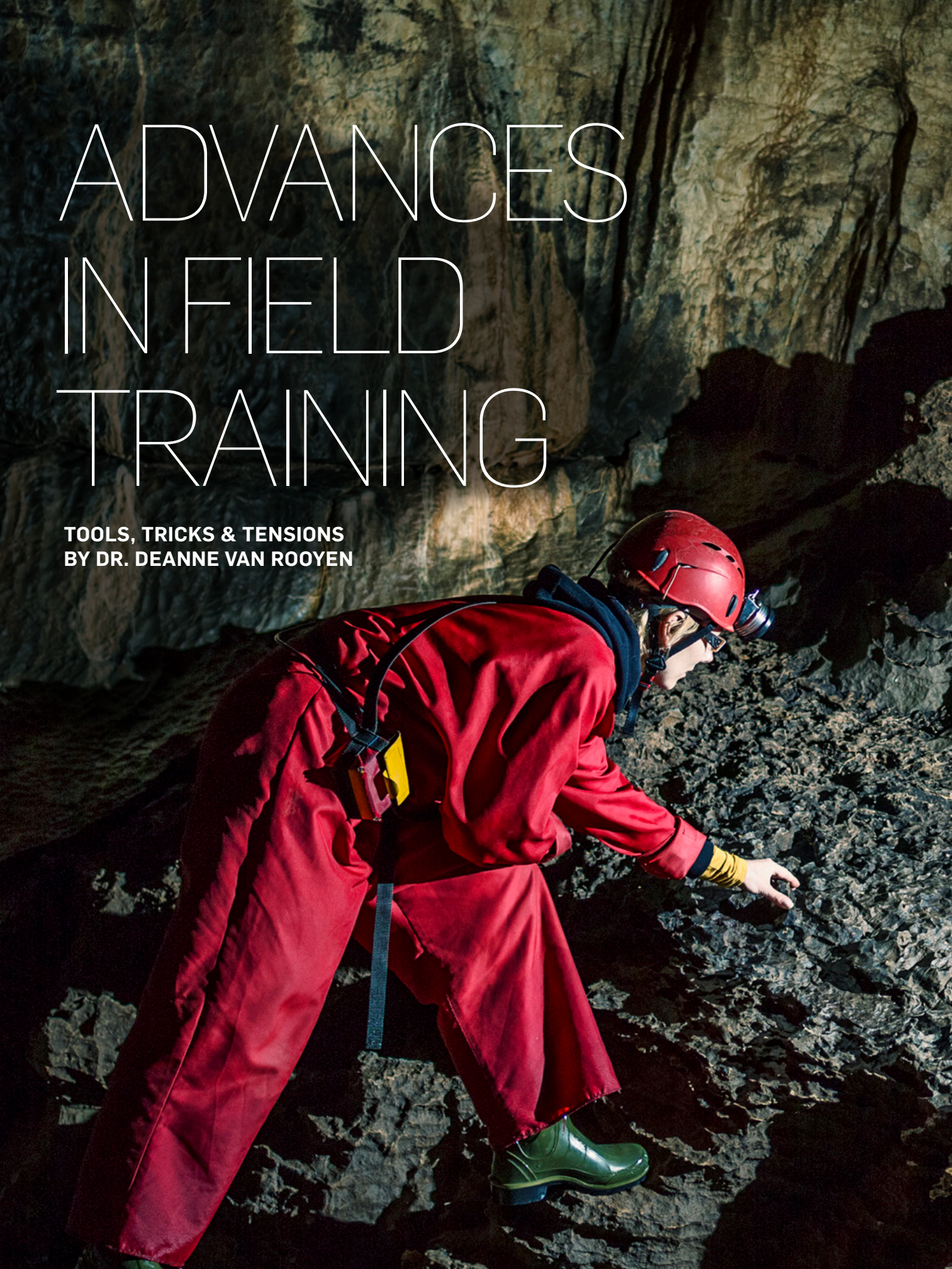
PDAC and MAC look forward to the continued application, future use, and advancement of the methodology by government, industry and external stakeholders, to better understand true mining-related disturbance.

PDAC regularly produces studies and reports related to the environmental, social and economic impacts of mineral exploration and mining development.
To read more reports produced by PDAC, click here or visit https://www.pdac.ca/programs-and-advocacy.

> Replicable methodologies like these highlight the importance of credible evidence-based tools for calculating disturbance.

ADVANCES IN FIELD TRAINING

TOOLS, TRICKS & TENSIONS
BY DR. DEANNE VAN ROOYEN



Geological field work is one of the mainstays of our profession.

In many ways doing field work today differs very little from work that Dr. William "I made the first geological map of the British Isles by following canals and outcrops on foot" Smith, or Sir William "I made the first geological map of Canada and also founded Canada's Geological Survey" Logan would have done back in their respective 18th- and 19th-century days as field geologists. We still collect some of the same data, stay in some of the same makeshift accommodations, and write down some of the same observations (albeit, in most cases, with fewer transport donkeys). In other ways, the work could not be more different, and the list of new devices and technological advances that have made some parts of field work easier is long and very exciting.

As a university-based field geologist I am fascinated by advances in how we do what we do, and particularly interested in how advances in technology are translated into student training and skill-building opportunities. This article is a meandering tour through some of my own favourite advances in geological field work and training, so apologies in advance if I leave out your favourite widget!

The best field tools are the ones that solve major problems. Strike and dip measurements can be automated with smart phones or tablets, which can all work well as mapping platforms. Or, simple photo editing on a smartphone can make it possible to take a photograph and annotate it on-the-spot. On a recent fieldwork trip to southern New Brunswick we took photos in the field, sent them to our colleagues in Spain with questions, received answers back immediately, and were able to adjust work plans accordingly. Of course, that was from a street corner in downtown Saint John – the city. An hour later we were in the woods where smart phones do not get service, and the fancy tablet refused to log into the mapping platform because it was out of internet range. So, with new technology, you win some and lose some.

Drone technology is an incredible asset to field geologists in a number of ways. The ability to photograph sometimes inaccessible outcrops and create three-dimensional reconstructions makes it possible to show detail, and scale, in difficult terrain. This is not 'new', as such – many geological surveys and companies have been developing this technology for decades. The accessibility and ease of use, however – as well as the lower cost of modern drones – have made this a widely used tool. The British Geological Survey (BGS) has an excellent overview of its work with drones. One can even use micro-drones now, which have a take-off weight of less than 250 grams, which is basically the size of your average Manitoba mosquito. Now, if we could only train the mosquitoes.

The use of 3D data acquisition and modeling has advanced in all fields of geoscience as well, and one can find everything from software, to building and rotating your own crystals, to outcrop-scale models. A tour through the excellent website Virtual 3D Geoscience (V3Geo) demonstrates some of the amazing possibilities with 3D reconstruction. That site, and its collections, also highlight another wonderful advance in how we approach geoscience education and training – the ability and willingness to create and share community resources for use by anyone. With this, the V3Geo team have created an amazing resource. Another favourite training tool is Visible Geology by SeeQuent, which allows users to build their own 3D outcrops, rotate them, look at cross sections, and even create drill holes through their stratigraphy. This tool is an excellent supplement in structural or exploration geology classes, or work applications.

Photogrammetry, LIDAR, and similar technology has been around for many years, but as with drones, the accessibility of these techniques has increased exponentially making them user-friendly and inexpensive. The real potential of these technologies expands beyond field work for geoscience; they are invaluable in environmental monitoring, hazard assessment for things like sinkholes or erosion, mining work in underground and open-pit environments, and geoengineering. The power of these technologies can be harnessed by communities, exploration companies, miners, and researchers alike.

Most of my experience with technology in the field comes from working on Geological Survey of Canada (GSC) projects in the GeoMapping for Energy and Minerals (GEM-2) program. During that program I had access to a multitude of excellent field tools, including portable magnetometers, portable XRF units, drones, and ToughPads for mapping with GSC software. It is an absolute joy to be able to map on a good digital platform with pre-loaded maps, databases to look up previous work, to be able to download work every night, and see maps literally grow and change day by day. But the thing that made the entire digital map experience work was not the hardware or software, even though those were all fantastic. The most important ingredient was the geographic information systems (GIS) specialist on every team who made everything work. With the projects I was involved in, the GIS was the incomparable Annick Morrin, from the Quebec City GSC office. She is not only a true expert in digital technologies, but is also a trained geologist who understands exactly what is needed for a seamless experience. There is absolutely no substitute for experts!

Being able to do things the analog way is incredibly valuable, and a really important part of field work – whether in training or professional environments. Take photography as an example: we can take wonderfully detailed photographs of almost everything now, but the thing that might end up being the most valuable for interpretation is the field sketch that shows the exact features that are the most important. GPS is amazing and absolutely necessary in most areas, but if it fails, or runs out of batteries, or simply doesn't pick up a satellite from a canyon on a cloudy day, one still needs to be able to navigate to the day's pick-up point with a map and a compass. Digital mapping on tablets is great, too, but once the tablets are returned to the depot after field season, what do we use for looking up our notes? The trusty old field book of course! Digital and analog tools are not an either/or proposition – it is both/and.

So, with the wealth of technical advancements we have at our disposal, what is the best way to train students to deal with these advancements, and still get the basic skills that are sorely needed by geoscience industries?

Thinking about this often starts further discussions on the purpose of field training in general. What good does field training do? Why should earth scientists and geologists get field training? They are good questions, and deserve some thoughtful answers that are beyond the binary of "All real geologists should do all the field work all the time," versus "Nobody needs it, we have drones now."

Field schools and research with field work are a mainstay of earth science training programs in Canada, and most of the world. Field schools are often required courses for graduation, and for professional registration as a geoscientist or environmental geoscientist. For many of us, the lure of field work in the great outdoors was the thing that first drew us into geology. For others, it was a barrier to advancement, or something to put up with to get on with a degree. For many, it was a formative experience during our education, and the good and bad parts have stayed with us for many years.

“
Field work will always be part of geoscience, and it is up to us to make sure it is an amazing part.
”

Field training – when done well – is a wonderful thing. It gives students the ability to work with real data in real time. It teaches them how to organize their work and develops good work habits. It can expand their horizons and their confidence. It can build teamwork skills and community connections. It can give students a real sense of place, and they can understand the processes involved in making a map and interpretations, as well as making them appreciate the effort that goes into any map. It can help attract and retain underrepresented students in our field. It can open up new avenues for thinking and expand students' understanding of their world. On the flip side, bad field training can be exclusionary, unsafe, or alienating for many individuals. It can perpetuate all the old stereotypes we struggle with in geology, and reinforce the idea that "Only some people can be real geologists." So what do we do about it? We make sure the good parts are available for everyone, and we actively work against the bad ones.

Every time we design a class or laboratory activity, we choose our teaching tools, our activities, our field school sites, and every assignment by thinking about the essential skills students will gain. My current favourite mapping training manual is the one from Anaconda Mining. One of my students introduced me to the manual they were given as a junior assistant. It is beautifully designed to be a step-by-step guide for maps and reports, and includes detailed instructions and examples for sketching outcrops, collecting data, and documenting features relevant to exploration. One of the strengths of the manual is how well it works as a companion to paper mapping and digital mapping – it works for both because it is designed to build observations and interpretations as layers of information, sometimes using actual transparencies for physical layers. This of course also works perfectly in graphics programs and GIS software. That is what we are striving for with training at all levels – giving students the skills to manage their work well, regardless of format. If you are ever in Ottawa and have time to visit the GSC, go see Logan's field notebooks. They are works of art, and his geological illustrations are still a study in how to convey scientific information in sketch form.

The best training in any field is a scaffolded process, where new skills are layered onto previously-acquired skills. We do not learn everything all at once. I saw a few real-life examples of this while I was a teaching assistant at Carleton University. One year, the department bought a group of laptops, loaded them with all the latest mapping software, and sent them to second-year field school students, so they could learn the software and produce beautiful digital maps of the study area. Great idea, but how did it go, you ask? It was an unmitigated disaster. The maps and reports were basically the worst anyone had seen in years of field school. Why? It was because the laptops were a distraction; the software was hard to learn (not because it was bad, but because it was new); the programs kept crashing; the server cable could not handle everything at once (this was pre-wifi); there was just too much going on. The students were so overwhelmed with trying to learn one difficult new skill (field mapping), at the same time as learning another difficult new skill (digital mapping with GIS), that they ended up learning very little of both. The next year, the university tried this again – same result. The year after that, I was in charge as a co-instructor, and we left the laptops at home. We gave everyone the paper base map and big sheets of paper, and crayons, and rulers. And? The maps were beautiful! The reports were back to their "normal" standard. The problem was not the students, or the laptops, or the software, or the mapping project – the problem was purely that there was too much to learn in too short a time.

A better model for incorporating digital mapping with field training is one where students do the field mapping, with all of the major interpretations and reporting first, and then spend time in a GIS lab to create a digital map. Basics come first. One can always train a good geologist to use a fancy digital tool when it is needed; it is much harder to work with a poorly-trained geologist.

Not all changes and advances in field training are technological. Some of the most welcome changes I've seen in my career as a geologist is an increased emphasis on safety and equity issues – especially where students are involved. We've seen an increasing recognition that not all field situations are created equal, and not all field scientists are comfortable in the same situations. I think this is a huge step forwards in creating a welcoming culture in our field.

We now recognize that some places are less safe for People of Colour, for female-presenting individuals, and for LGBTQI2S+ individuals. We recognize that sending all students into the same situation can be fine for many, but downright dangerous for others. This is not because of a lack of skill or ability, but because of external perceptions, demographics, or attitudes. Preparing students for all eventualities means addressing those issues proactively with all students – not waiting until a problem arises, and not putting the responsibility of addressing difficult situations only on the student(s) affected. We would never say, "Oh, bears are only a problem for a few people, so we never discuss them as a group." Contrarily, we discuss bear safety for everyone. We need to be proactive in how we train students to do their own field work, because their training becomes their culture, and their culture becomes the larger field culture.

In an excellent article by Olcott and Downen in the 2020 EOS special volume "Reimagining the Geosciences", they discuss some of the specific challenges faced by LGBTQI2S+ individuals in geoscience. Many countries in the world still have very strict laws criminalizing LGBTQI2S+ individuals. When field courses are held in places where this is an issue, students are put in a position of self-selecting out of educational experiences (particularly problematic if it is a required part of a degree), or putting themselves in danger. This is never a choice that students should have to make. Similarly, a companion article by Anadu, Ali, and Jackson in the same EOS volume looks specifically at the experience of People of Colour in geoscience and proposes several ways to ensure student safety. A memorable quote from the article is "*A proactive fieldwork strategy would consider protection from racial discrimination and racialized violence with at least the same diligence carried out to protect students from ticks, falls, or snake bites.*" I really cannot say it any better than that!

If you've never read the 2014 article on sexual assault and harassment of trainees in field settings by Kate Clancy and co-authors, now is a great time. Titled "Survey of Academic Field Experiences (SAFE): Trainees Report Harassment and Assault", this seminal work helped to open up a conversation that most geoscientists never even considered having. The article, written almost a decade ago, presented hard data about the prevalence of assault and harassment experienced by women in field settings across natural and social sciences. It made for grim reading, but sparked a realization that this was not an isolated problem, or something that could be swept back under the rug.

Many people are working very hard to make our field a better place for everyone in it. One shining example is Susan Lomas, an industry pioneer who started the Me Too Mining Association. I heard her give a talk at the 2019 Atlantic Universities Geoscience Conference (AUGC) Student Conference, and was blown away by her eloquence, courage, and her humanity. Susan is a fantastic speaker and educator, and created the DIGGER training program, specifically designed for companies and staff in the geoscience and mining industry to address harassment, provide bystander intervention training, and create a safer work environment. The big take-away point: every single person in the industry has a role to play in making it safer.

Accessibility is major topic in pedagogical circles, and field training is definitely part of that discussion. There is amazing work being done throughout the world on making sure students with different abilities can access field training. For some it might mean that a student in a wheelchair is able to go on field camps and act as the drone operator. Or they do their part of the map along an accessible trail. Or they are the data guru. One of the best current examples is the GeoScientists Promoting Accessible Collaborative Experiences (GeoSPACE) program of the United States Geological Survey (USGS). Administered in cooperation with academic institutions, this program shows how students with disabilities can participate in person, or virtually, and are an integral part of each field project. Locations are chosen for accessibility (in this case volcanic fields where features are close together) and participants work as a team. Similarly, the International Association for Geoscience Diversity has a website full of projects, field schools, and research including some excellent documentary-style films about their work. Accessibility may not always mean that everyone does exactly the same thing, but it should mean that no one is summarily excluded just because they do not fit the preconceived mold of what a geologist "should" look like, or be able to do. By thinking about how we can

expand field training for everyone, rather than limit it, we all gain a better understanding of how to work with people, how to be compassionate and caring scientists, and how to make our workplaces more welcoming.

Anyone who has ever taught field school will know that the biggest impacts from such a course are not limited to academic skills. Yes, absolutely, by seeing rocks in the field and being responsible for actual mapping and interpretations students gain valuable experience and concrete skills. But the bigger impact is in their intellectual development, and the growth in their ability to trust their own observations, think for themselves, and develop their own perspectives. Students need a chance to do all those great things without having to worry about being excluded or in danger. Our job as educators, mentors, bosses, managers, and coworkers is to make that possible.

My wish is for all students in geology and earth science programs to experience the beauty, wonder, and challenges that comes with good field training, and for them to be able to develop skills that will last their whole careers.

Field work will always be part of geoscience, and it is up to us to make sure it is an amazing part. Of course, no technology or training in the world will make the rain stop or help the fog lift when you are stuck somewhere. For that there may be no better remedy than the very analog, very battered pack of playing cards in your backpack to pass the hours with your teammates.

I wonder if Dr. Smith and Sir Logan were decent card players? If not, I'm sure they would be absolutely enthralled by a long discussion of those newfangled ideas about plate tectonics!

"We've seen an increasing recognition that not all field situations are created equal, and not all field scientists are comfortable in the same situations. I think this is a huge step forwards in creating a welcoming culture in our field."

Dr. Deanne van Rooyen is an Associate Professor of Geology at Acadia University, Assistant Department Head, Undergraduate Advisor, and co-teaches advanced field school programming. With a PhD in Earth Sciences from Carleton University, her research focusses on understanding the interaction between cratonic margins and accreted terranes in the Northern Appalachians, Northern Quebec, and Labrador using a combination of field work, structural geology, geochronology and thermobarometry. She co-founded the Bachelor of Arts and Science in Environment degree program at Cape Breton University, and is a past Marie-Claire Ward Geoscience Award recipient. Before establishing a career in geology, Dr. van Rooyen was a professional harpist.

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